



IN RE APPLICATION : Jay T. Armstrong
 FOR : **IN-SITU ABRASIVE
 BELT/PLAINER
 CLEANING SYSTEM**
 SERIAL NO. : Unknown
 FILED : Herewith
 APPLICANTS ADDRESS : 2251 White Oak
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August 25, 1997

37 C.F.R. 1.27
STATEMENT OF STATUS AS
A SMALL ENTITY - INDEPENDENT INVENTOR

Commissioner of Patents and Trademarks
 Washington, D.C. 20231

Dear Sir:

The undersigned, Jay T. Armstrong, declares that he is an independent inventor of the invention described and claimed in the foregoing application; that (1) he has not assigned, granted, conveyed or licensed and (2) he is under no obligation or contract or law to assign, grant, convey, or license, any rights in said invention to any person who could not likewise be classified as an independent inventor under 37 C.F.R. 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. 1.9(d) or a non-profit organization under 37 C.F.R. 1.9(e).

The undersigned acknowledges that he has the duty to file a notification of any change in status of this application and any patent(s) issuing therefrom which change results in a loss of entitlement to small entity status prior to, or at the time of paying, the earlier of the issue fee or any maintenance fee due after the date on which the small entity status is no longer appropriate.

The undersigned further declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful and false statements may jeopardize the validity of the application nor any patent issuing thereon.

By:  Date: 8-25-97
 Jay T. Armstrong

ABSTRACT

A system for cleaning abrasive sanding and/or planing media (e.g., sandpaper, wide belt

- 5 sanding belts, planers, grinding wheels or other abrasive surfaces) while in-situ in the sanding, planing, grinding equipment, (or when removed), while the abrasive media is being used (or while the abrasive media is not being used); by means of propelling dry ice (CO_2 , solid carbon dioxide) particles towards the abrasive surface causing the dry ice particles to impact at high velocity on the abrasive media while rotating the abrasive surface so that the dry ice particles impact different locations of the abrasive media surface. The dry ice (CO_2 , solid carbon dioxide) particles are propelled as to impact the abrasive surface at varying angles and locations as necessary to effectively clean the abrasive surface. The system disclosed herein will allow for the abrasive media to be cleaned while the abrasive media is being used for its' intended purpose and thereby reducing equipment downtime usually associated with cleaning and/or changing the
- 10 abrasive media due to becoming dirty and/or worn.
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Field of Invention

This invention relates to a system for in-situ cleaning of abrasive sanding or planing media used for sanding, planing, grinding or for otherwise abrasively preparing or finishing wood, metal or other surfaces and, in particular, to the utilization of dry ice (CO₂, solid carbon dioxide) particles for cleaning the abrasive media surfaces [in-situ] while the abrasive media is being used for its' intended purpose, or [removed] while the abrasive media is not being used.

Background of the Invention

Abrasive sanding or planing devices, (also referred to as sandpaper, sanding belts, abrasive planers, or grinding surfaces), are used throughout industry for removing a portion of a material's surface as to create a suitable surface finish for the specific requirements. In the 15
woodworking industry, sanding belts are used for removing a portion of the wood surface from a piece of wood as to create a particular finish on the resulting wood surface. An example of such a sanding (abrasive) belt is the VFM 36"x75", 80 grit belt. A typical abrasive belt such as the 20
VFM 36"x75" would be approximately 36" x 75" and the belt would be typically placed into an automatic wide belt sanding device, with the abrasive surface exposed, and held in place by a 25
series or rollers in the sanding equipment, equipment such as the Cemco Model 2000 wide belt 30
sander. The Cemco Model 2000 would then be turned on and the abrasive belt would then begin 35
to rotate. An operator would then begin placing material into a pathway as to come into contact 40
with the abrasive surface of the VFM 36"x75" belt. As the abrasive surface of the belt comes 45
into contact with the material being sanded, the abrasive surface of the belt removes a portion of 50
the wood surface and, as a result of this sanding operation, the widebelt begins to "load" up with pieces of the material being sanded. In wood products this "loading" may comprise pieces of wood, sap, glue and/or burnt wood particles. The abrasive surface of the belt will continue to sand a surface until it becomes loaded to the extent where it ceases to provide the necessary 55
sanding characteristics. At this time, the operator typically removes the sanding belt and replaces it with a new one, permanently disposing of the used, loaded up, abrasive sanding belt.

In the prior art, attempts to clean abrasive sanding/planing media have included the use 55
of solvents, water or a gummy type solutions requiring that the abrasive belt be removed and 60
applying the solution to the surface. As a result of this cleaning method, the belt is only partially cleaned. In addition, the belt, most often having a paper type backing, tends to stretch after 65
exposure to these cleaning solutions and will no longer fit correctly onto the sanding equipment. In any case, the belt life is greatly reduced from these methods of cleaning. A problem with removing the belts from the equipment is that it reduces the production capacity of the machine

at a rate relative to the amount of time required to shut the machine down and remove, replace
and reset the belt on the machine, and it requires the retensioning the belt on the equipment to
5 their previous tensions so that the material being process through the equipment will have the
same finish as the previous material process before cleaning the abrasive belts. Since the belts
10 tend to stretch after application of the cleaning solution(s), the belts either do not tighten
correctly or they fall apart as the equipment is turned on and operated. Another major problem is
15 that as the abrasive belt loads up, the amount of sanding/grinding/planing decreases and effects
the quality of the materials being processed.

20 The problem of not being able to clean the abrasive surface of sanding, planing, or
grinding equipment is a major problem in the area of surface preparation/finishing. The cleaning
of abrasive sanding, planing, and/or grinding surfaces is a long outstanding problem within the
25 woodworking and metalworking industry which the prior art(s) have not been able to solve.

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SUMMARY OF THE INVENTION

The problems discussed above are eliminated by a method, process and apparatus that involves the in-situ cleaning of the abrasive sanding, planing or grinding surface by propelling dry ice (CO_2 , solid carbon dioxide) particles at the abrasive sanding, planing or grinding surface at varying angles as to clean the entire abrasive surface. After numerous hours of experiments and testing, the results achieved have been unexpected as the abrasive belts have been completely cleaned, in-situ, like new, without causing any damage to the abrasive sanding, planing or grinding surface or to the belt's backing as a result of the impact of the dry ice particles. Furthermore, the belts may be cleaned in the application equipment while the equipment is operational and processing material, without effecting the equipment's operation, and drastically increasing the quality of the finished material. Initial test results indicate that a typical abrasive sanding, planing or grinding belt may be cleaned and reused a minimum of at least two (2) times during its' usable life, meaning that a user may reduce his new abrasive belt purchases by a factor of at least two (2). In addition, significant production savings are realized by not having to change the abrasive belt as often when it is cleaned in-situ with the dry ice particles.

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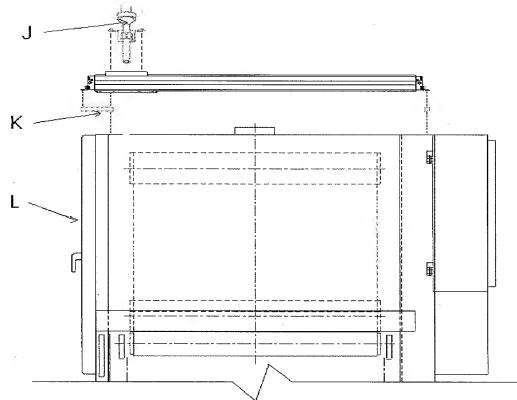
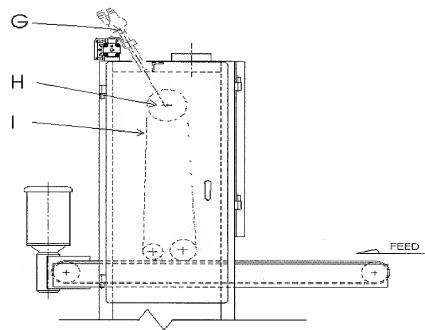
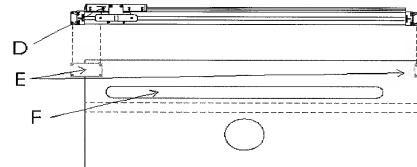
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Brief Description Of The Drawing

FIGURE 1. A through L illustrate a perspective view of the mechanical and pneumatic elements of a portion of the cleaning system in accordance with the invention.

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Detailed Description Of The Drawing

Figure 1, A through L illustrate view of the cleaning system with the exception that the CO₂ particle blaster **M**, and hoses **N** and **O**, and dry ice storage means **P**, and dry ice grinding means **Q**, and suction or vacuum device or apparatus **R** of FIGURE 1 are not shown.

As illustrated in FIGURE 1, element **L** represents a typical abrasive belt sanding apparatus that is connected to a belt sanding piece of equipment **I** by means of tension rollers **H**; whereas, the CO₂ particle blaster **M**, and hoses **N** and **O**, and dry ice storage means **P**, and dry ice grinding means **Q** are located remotely from the belt sanding equipment or surface. The dry ice directional dispensing device **G** for the blast installation, the use of a nozzle is sufficient, such as is known from dry ice surface preparation technology, is connected to the CO₂ particle blaster **M**, by means of hoses **N** and **O**, and the system is supplied with dry ice particles for blast cleaning by storage means **P**, or by dry ice grinding or shaving means **Q**. An opening is made in the abrasive belt sanding apparatus **F** and an x-rail motion control device **A,B & C** is connected to the belt sanding apparatus. The x-rail motion control device **A,B, & C** has a mounting device **B** for connecting the dry ice dispensing device **G**. The particles of dry ice being propelled by means of the dry ice directional dispensing nozzle **G** are directed towards the abrasive belt **I** surface as the abrasive belt **I** is being rotated by means of tension rollers **H** or as the abrasive belt **I** is stationary or removed. The removed surface contaminants may be captured, contained and/or collected by means of suction or a vacuum device or apparatus **R**. The dry ice directional dispensing nozzle **G** may be directed towards the abrasive belt **I** surface by manual means or by means of attaching the dry ice directional dispensing nozzle **G** to an x-rail motion control device **A,B & C** that will automatically move the dry ice directional dispensing nozzle **G**, at a fixed or variable distance from the abrasive belt **I** surface, across the x-axis of the abrasive belt **I** surface. The angle of impact of the dry ice particles, and the cleaning ability of this system is optimized at the angle shown between the directional dispensing device **G** and the tension roller **H**.

Although several embodiments of this invention have been illustrated and described, it is to be understood that by one skilled in the art that numerous changes and modifications may be carried out in this invention shown and described without departing from the spirit and scope of the claimed invention. In particular, one skilled in the art could readily envision removing the abrasive belt from the equipment and clean the belt removed from the equipment. Further, one skilled in the art could readily adapt the process for cleaning other types of sanding, planing and grinding surfaces than those specified within the embodiment.

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What is Claimed Is:

1. A process using dry ice (CO_2 , solid carbon dioxide) particles for in-situ cleaning of abrasive sanding, planing and/or grinding surfaces which have been loaded up with removed material(s) generated during the sanding, planing and/or grinding procedure, wherein solid CO_2 particles are directed at a high velocity towards the abrasive sanding, planing and/or grinding surface and caused to impact the abrasive sanding, planing and/or grinding surface in such a way as to remove the contaminants from the abrasive sanding, planing and/or grinding surface and result in a clean, or renewed, abrasive sanding, planing and/or grinding surface.

2. Process in accordance with claim 1 wherein suction is applied to the dry ice particle application area during the cleaning process to capture, contain and/or collect the removed contaminants from the abrasive sanding, planing and/or grinding surface.

3. Process in accordance with claim 1 wherein the cleaning area is located in the sanding, planing or grinding equipment so that the abrasive sanding, planing and/or grinding apparatus does not have to be stopped or removed from the sanding, planing or grinding equipment.

4. Process in accordance with claim 1 wherein the sanding, planing and/or grinding apparatus is removed from the sanding, planing or grinding equipment and the cleaning area is located remotely, or at another location, away from the sanding, planing or grinding equipment.

5. Process in accordance with claim 1 wherein the solid CO_2 particles are directed at a high velocity towards the abrasive sanding, planing and/or grinding surface either with a hand-held dispensing device or a dispensing device connected to an x-axis and/or a y-axis motion control device or apparatus.

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DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe that I am the original, first, and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**IN-SITU ABRASIVE BELT/PLAINER
CLEANING SYSTEM**

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, 1.56 (a).

I hereby claim foreign priority benefits under Title 35, Code of Federal Regulations 119 of any foreign applications(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date below that of the application on which priority is claimed:

NONE

I hereby claim the benefit under Title 35, United States Code 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code 112. I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations 1.56 (a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

NONE

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful and false statements may jeopardize the validity of the application or any patent issuing thereon.

Request Under MPEP, Section 707.07(j): The undersigned, a pro-se applicant, respectfully requests that if the Examiner finds patentable subject matter disclosed in this application, but feels that Applicant's present claims are not entirely suitable, the Examiner draft one or more allowable claims for the Applicant.

Full name of first sole inventor:

Jay T. Armstrong

Inventor's Signature:



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August 25, 1997

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I hereby certify that this paper or fee is being deposited with the United States Postal Service using "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to "Commissioner of Patents and Trademarks, Washington, D.C. 20231."

Signed: 

Inventor: Jay T. Armstrong

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